

**STORM WATER MANAGEMENT PLAN
FOR
29610 Mac Tan Road
APN 188-191-28**

**Valley Center, California
County of San Diego**

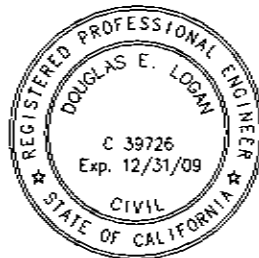
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Submitted to:
**The County of San Diego
Department of Planning and Land Use**

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For:
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8-11-08

DATE

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1.0 INTRODUCTION

This Storm Water Management Plan (SWMP) is required under the County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (section 67.817). The purpose of this SWMP is to address the water quality impacts from the proposed Tentative Parcel Map. Best Management Practices (BMPs) will be utilized to provide a long-term solution to water quality. This SWMP is also intended to ensure the effectiveness of the BMPs through proper maintenance that is based on long-term fiscal planning. The SWMP is subject to revisions as needed by the engineer.

1.1 Project Description

The proposed project site is located off of the west side of Mac Tan Road, south of SR-76, north of Valley Center Road, east of Cole Grade Road, and west of Valley Center Road. The existing site consists of a single family residential structure, located on a single parcel. Drainage from the existing site is primarily conveyed in a southerly direction across the project site. As this drainage is directed to the south, it is conveyed overland via one of two natural channels that cross the project site.

The project is located in the San Luis Rey Hydrologic Unit and the unnamed intermittent streams Hydrologic Subarea (903.16 HSA). The area is primarily comprised of existing residential development and agricultural land, however only large estate residential development has occurred in the vicinity of the project site. The existing conditions of the proposed project site consist of an existing residential structure located on a roughly 5 acre parcel. The terrain varies from flat to moderately steep slope, with the predominant slope in a north to south decline. In addition, two unnamed existing natural channels run through the project site. Elevations are on the order of 1655 to 1635 feet above mean sea level, with the lowest elevation found along the southerly property boundary roughly in the middle of proposed Parcel 1, and the highest elevation at the northeasterly property corner. Existing drainage of the site is facilitated by sheet flow in a southerly direction across the parcel.

The project site consists of a two parcel split with one parcel containing an existing single family residential home and the second parcel proposes grading for a future single family residence. No additional improvements are proposed on the existing single family residential home parcel at this time. Some undisturbed terrain covered with natural vegetation is proposed to remain.

The drainage of the proposed development will essentially maintain the same flow patterns as the existing condition. Grass lined BMP swales will be utilized to direct storm water on site safely away from the proposed structures. The intent of storm drain system design was to maintain the existing conditions to the maximum extent practicable. In addition to the grass lined BMP swales proposed along with the grading of the pad for Parcel 2, an additional 50 linear feet of grass lined BMP swale is proposed at the southeasterly corner of Parcel 2 along the west side of Mac Tan Road. This section of grass lined BMP swale is intended to address the future increased

impervious surface resulting from the improvements as illustrated by the DPW Preliminary Draft Requirements.

Storm water generated on-site, flows in a southerly manner. On-site runoff will initially sheet flow and either then be collected in a grass lined swale. Ultimately all storm water generated on-site or tributary to the project site flows to the one of the two unnamed existing natural channels that cross the property, at which point it is conveyed in a westerly manner, and eventually into Moosa Canyon Creek, then into the San Luis Rey River and ultimately into the Pacific Ocean at the mouth of the San Luis Rey River.

Storm water discharged from the project site is not anticipated to disrupt the natural downstream drainage course. The peak discharge from the site will not be increased in comparison to that of the existing condition; therefore the potential for erosion related to an increase peak flow and an overburdening of the downstream systems is reduced and negligible.

1.2 Hydrologic Unit Contribution

The project is located in the San Luis Rey Hydrologic Unit and the unnamed intermittent streams Hydrologic Subarea (903.16 HSA). The project area is characterized by residential development, open space areas, and areas that are or potentially may have been utilized for agricultural purposes historically. The storm water tributary and generated on the project site will discharge to one of two existing natural channels that cross the project site, at which point it is conveyed in a westerly manner, and eventually into Moosa Canyon Creek, then into the San Luis Rey River and ultimately into the Pacific Ocean at the mouth of the San Luis Rey River. The proposed project will not alter existing drainage patterns on the site, nor will the proposed project alter the hydrologic or hydraulic characteristics of the unnamed existing natural channels.

2.0 WATER QUALITY ENVIRONMENT

2.1 Beneficial Uses

As stated in the previous section, 1.2, the proposed project site is located in the unnamed intermittent streams Hydrologic Subarea (903.16 HSA). The beneficial uses for the hydrologic unit are outlined in the San Diego Basin Plan, as shown below:

AGR - Agricultural Supply: Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

IND - Industrial Services Supply: Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

REC1 - Contact Recreation: Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.

REC2 - Non-Contact Recreation: Includes the uses of water for recreational involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

WARM - Warm Freshwater Habitat: Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

WILD - Wildlife Habitat: Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

The unnamed intermittent streams Hydrologic Subarea (903.16 HSA) is also listed with the following potential beneficial uses:

MUN - Municipal and Domestic Supply: Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters	1,2	Hydrologic Unit Basin Number	BENEFICIAL USE																S P W N	
			M U N	A G R	I N D	P R O C	G W R	F R S H	P O W	R E C	R E C	B I O L	W A R M	C O L D	W I L D	R A R E				
San Luis Rey River Watershed - continued																				
unpaired intermittent streams		3.16	+	•	•															
Moose Canyon		3.14	+	•	•															
Moose Canyon		3.13	+	•	•															
Turner Lake		3.13																		
See Reservoirs & Lakes- Table 2-4																				
South Fork Moose Canyon		3.13	+	•	•															
Moose Canyon		3.12	+	•	•															
Gopher Canyon		3.12	+	•	•															
South Fork Gopher Canyon		3.12	+	•	•															
San Luis Rey River		3.11	+	•	•															
Higgin Creek		3.11	+	•	•															
Windmill Canyon		3.11	+	•	•															
Tuley Canyon		3.11	+	•	•															
Lawrence Canyon		3.11	+	•	•															
Mouth of San Luis Rey River		3.11																		
See Coastal Waters- Table 2-3																				
San Diego County Coastal Streams																				
Loma Alta Creek		4.10	+																	
Loma Alta Slough		4.10																		
See Coastal Waters- Table 2-3																				

- Existing Beneficial Use
○ Potential Beneficial Use
+ Exempted From MUN (See Text)
- ¹ Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.
² Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

The beneficial uses of ground waters for Hydrologic Subarea (903.10) Lower San Luis Rey are included below:

MUN - Municipal and Domestic Supply: Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

AGR - Agricultural Supply: Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

IND - Industrial Services Supply: Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water	Hydrologic Unit Basin Number	BENEFICIAL USE											
		MUN			AGR			IND			POTENTIAL		
		A	G	R	A	G	R	I	N	D	P	R	O
SANTA MARGARITA HYDROLOGIC UNIT		2.00											
Ysidora	HA 2	●	●	●	●	●	●	●	●	●	●	●	●
Deluz	HA	●	●	●	●	●	●	●	●	●	●	●	●
Murietta	HA	●	●	●	●	●	●	●	●	●	●	●	●
Alud	HA	●	●	●	●	●	●	●	●	●	●	●	●
Pechanga	HA	●	●	●	●	●	●	●	●	●	●	●	●
Wilson	HA	●	●	●	●	●	●	●	●	●	●	●	●
Cave Rocks	HA	●	●	●	●	●	●	●	●	●	●	●	●
Aguanga	HA	●	●	●	●	●	●	●	●	●	●	●	●
Oakgrove	HA	●	●	●	●	●	●	●	●	●	●	●	●
SAN LUIS REY HYDROLOGIC UNIT		3.00											
Lower San Luis	HA 2	●	●	●	●	●	●	●	●	●	●	●	●
Monserrate	HA	●	●	●	●	●	●	●	●	●	●	●	●
Pala	HSA	●	●	●	●	●	●	●	●	●	●	●	●
Pauma	HSA	●	●	●	●	●	●	●	●	●	●	●	●
La Jolla Amago	HSA	●	●	●	●	●	●	●	●	●	●	●	●
Warner Valley	HA	●	●	●	●	●	●	●	●	●	●	●	●
Warner	HSA	●	●	●	●	●	●	●	●	●	●	●	●
Combe	HSA	●	●	●	●	●	●	●	●	●	●	●	●

2 These beneficial uses do not apply westward of the eastern boundary of the eastern boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

- Existing Beneficial Use
- Potential Beneficial Use

Table 2-5
BENEFICIAL USES

2.2 303(d) Status

According to the California 1998 and 2002 CWA 303d list published by the San Diego Regional Water Quality Control Board shown below, there are no impaired water bodies that are directly associated with the unnamed intermittent streams Hydrologic Subarea (903.16 HSA).

The project location and watersheds have been compared to the current published 303d list of impaired water bodies. There are no impaired or water quality limited segments directly associated with the project site. Drainage from the site is conveyed in a westerly manner, and eventually into Moosa Canyon Creek, then into the San Luis Rey River and ultimately into the Pacific Ocean at the mouth of the San Luis Rey River. The Pacific Ocean at the San Luis Rey River Mouth is identified as being impaired by bacterial stressors, and the lower portion of the San Luis Rey River is identified as being impaired by chloride and total dissolved solids. The project site is roughly 10 mile from the impaired waterbody.

		river, upper			
17 Gavilan HSA (902.22)	Sandita Creek	lower 1.5 miles	Total Dissolved Solids	lower 1.5 mile	2002
18 Wolf HSA (902.52)	Murrieta Creek		Phosphorus	12 miles	2002
19 San Luis Rey HU (903.00)	Pacific Ocean Shoreline	at San Luis Rey River Mouth	Bacterial Indicators ^E	0.5 miles	1998
20 Mission HSA (903.11)	Lake Guajome		Eutrophic	33 acres	1998
21 Mission HSA (903.11)	San Luis Rey River	lower portion	Chloride	lower 13 miles	2002
			Total Dissolved Solids	lower 17 miles	2002
22 Loma Alta HA (904.10)	Pacific Ocean Shoreline	at Loma Alta Creek Mouth	Bacterial Indicators ^E	1.1 mile	1998
23 Loma Alta HA (904.10)	Loma Alta Slough		Bacterial Indicators ^E	8 acres	1998
			Eutrophic		
24 Buena Vista Creek HA (904.20)	Pacific Ocean Shoreline	at Buena Vista Creek Carlsbad City Beach at Carlsbad Village Drive Carlsbad State Beach at Pine Avenue	Bacterial Indicators ^E	1.2 miles	1998

3.0 CHARACTERIZATION OF PROJECT RUNOFF

3.1 Existing and Post-Construction Drainage

The hydrologic model of the project site, in both the existing and developed condition, incorporates the analysis of storm water discharge at two locations. The complete hydrologic analysis of existing and developed condition can be found in the PRELIMINARY HYDROLOGY REPORT for 29610 Mac Tan Road, dated June 24, 2007 prepared by HL Engineering and Surveying.

The project site hydrologic models for both the pre- and post-developed conditions encompass a total area of 17.30 acres for the easterly basin and 192.43 acres for the westerly basin, and each condition consists of two separate sub-basins. Evaluating the two hydrologic models, the proposed development will maintain the hydrologic and hydraulic characteristics of the westerly watershed identically to the existing conditions. However the hydrologic and hydraulic characteristics of the easterly watershed, associated with the proposed parcel 2 residential lot amount of runoff discharged from the project site, will be slightly impacted. The addition of the residential structure and driveway will create an increase in impervious surface and result in slightly more runoff being discharged from the project site as compared to the runoff from the site in the existing conditions. Due to the fact that the proposed design includes creating a graded flat pad suitable for construction of a residential structure, the flow path of stormwater generated on parcel 2 in the vicinity of the driveway or structure will be attenuated by the flat flow path and the drainage improvements. However the hydrologic model for the proposed developed condition illustrates that an increase in the 100-year peak discharge as compared to the existing condition model of 0.19 cfs, an increase of only 0.56% from the existing condition peak flow, and therefore no significant impact to the downstream conditions is anticipated.

The post-developed condition 85th percentile water quality flow required to be treated by either flow based or volume based BMPs is limited to the area within the project site proposed for development. Since the offsite area tributary is not impacted by the project site, no treatment of this area is required. The following spreadsheet illustrates the calculations utilized in determining the 85th percentile runoff flow required for treatment.

85TH PERCENTILE PEAK FLOW AND VOLUME DETERMINATION
Modified Rational Method - Effective for Watersheds < 1.0 mi²

Note: Only Enter Values in Boxes - Spreadsheet Will Calculate Remaining Values

Project Name
Work Order
Jurisdiction

BMP Location

85th Percentile Rainfall = inches
(from County Isoplethial Map)

Developed Drainage Area = acres
Natural Drainage Area = acres
Total Drainage Area to BMP = acres

Dev. Area Percent Impervious = %
Overall Percent Impervious = %

Dev. Area Runoff Coefficient =
Nat. Area Runoff Coefficient =
Runoff Coefficient =

Time of Concentration = minutes
(from Drainage Study)

RATIONAL METHOD RESULTS

Q = CIA where Q = 85th Percentile Peak Flow (cfs)
C = Runoff Coefficient
I = Rainfall Intensity (0.2 inch/hour per RWQCB mandate)
A = Drainage Area (acres)

V = CPA where V = 85th Percentile Runoff Volume (acre-feet)
C = Runoff Coefficient
P = 85th Percentile Rainfall (inches)
A = Drainage Area (acres)

Using the Total Drainage Area:

C =
I =
P =
A =
Q =
V =

Using Developed Area Only:

C =
I =
P =
A =
Q =
V =

From the spreadsheet on the previous page, the calculated required 85th percentile flow was found to be 0.41 cfs, and if volume based BMPs are chosen to be utilized a volume of 0.18 acre-feet would be required to be treated.

The BMP design and layout will be finalized with proposed grading plans approval. As stated in section 7.0 of this report presently the primary BMP that will be utilized to meet the post-construction treatment requirements will be Biofilters, otherwise commonly referred to as grass lined swales. Layout, design and verification that the proposed biofilter swales are sized appropriately to handle the treatment flow tributary to each device will be completed with the improvement and grading plans. However to ensure that a biofilter swale is a feasible and appropriate BMP, the following sizing spreadsheet has been included:

Grassy Swale Design Spreadsheet

Given:
Design flow 0.41 cfs
Residence time (req) 10 minutes

Trapezoid Channel Design Parameters:

y 0.25 feet
l 6 feet
w 4 feet
SS1:SS2 4 ft/ft
A 1.25 sq ft

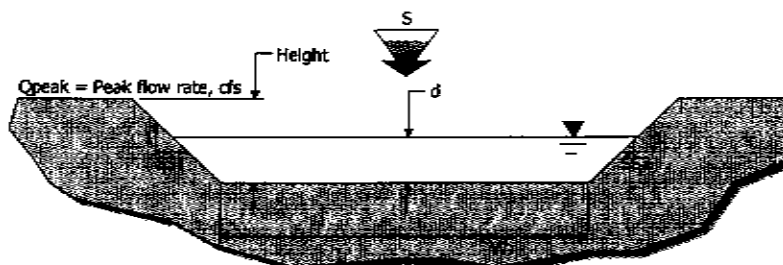


Diagram of Swale Variables Used in Spreadsheet

Find Qmax of channel:

Q= $(1.49/n) * A * R^{(2/3)} * s^{.5}$
n 0.2
s 0.01 ft/ft (long. Slope)
r 0.217391 ft
Q= 0.338688 cfs

Find Velocity in channel

V=Q/A
Therefore:
V = 0.328 fps

Required Length of Channel:

L=vt
Therefore:
L= 196.8
PROJECT DESIGN TO USE: L= 200

From this spreadsheet it appears that biofilters will satisfy the water quality goals established for this project site. The grass lined swale design consists of three BMP swales, with a total length of approximately 310 linear feet. This configuration will not only meet but exceed the water quality goals established for this project site.

3.2 Existing and Post-Construction Drainage

There are no sampling data available for the existing site condition, although the storm water discharge in the pre-developed condition is expected to have high concentration of nutrients, pesticides and herbicides. In addition, the proposed project is not expected to generate significant amounts of non-visible pollutants. However, the table on the following page illustrates constituents that are commonly found on similar developments and could affect water quality:

TYPICAL POST-CONSTRUCTION POLLUTANTS

Priority Project Categories	General Pollutant Categories								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Attached Residential Development	X	X			X	P ⁽¹⁾	P ⁽²⁾	P	X
Commercial Development >100,000 ft ²	P ⁽¹⁾	P ⁽¹⁾		P ⁽²⁾	X	P ⁽⁵⁾	X	P ⁽³⁾	P ⁽⁵⁾
Automotive Repair Shops			X	X ⁽⁴⁾⁽⁵⁾	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft ²	X	X			X	X	X		X
Parking Lots	P ⁽¹⁾	P ⁽¹⁾	X		X	P ⁽¹⁾	X		P ⁽¹⁾
Streets, Highways & Freeways	X	P ⁽¹⁾	X	X ⁽⁴⁾	X	P ⁽⁵⁾	X		
Retail Gas Outlets			X	X ⁽⁴⁾	X		X		
<p>X = anticipated P = potential (1) A potential pollutant if landscaping exists on-site. (2) A potential pollutant if the project includes uncovered parking areas. (3) A potential pollutant if land use involves food or animal waste products. (4) Including petroleum hydrocarbons. (5) Including solvents.</p>									

The following table lists products that are commonly used in the construction of residential developments and identifies the pollutants that can potentially result if these products are exposed to rain water or storm water runoff:

CATAGORY	PRODUCT	POLLUTANTS
Adhesives	Adhesives, Glues Resins, Epoxy Synthetics Calks, Sealers, Putty, Sealing Agents Coal Tars (Naptha, Pitch)	Phenolics, Formaldehydes Phenolics, Formaldehydes Asbestos, Phenolics, Formaldehydes Benzene, Phenols, Naphthalene
Cleaners	Polishes (Metal, Ceramic, Tile) Etching Agents Cleaners, Ammonia, Lye, Caustic Sodas Bleaching Agents Chromate Salts	Metals Metals Acidity/Alkalinity Acidity/Alkalinity Chromium
Plumbing	Solder (Lead, Tin), Flux (Zinc, Chloride) Pipe Fitting (Cut Shavings) Galvanized Metals (Nails, Fences) Electric Wiring	Lead, Copper, Zinc, Tin Copper Zinc Copper, Lead
Painting	Paint Thinner, Acetone, MEK, Stripper Paints, Lacquers, Varnish, Enamels Turpentine, Gum Spirit, Solvents Sanding, Stripping Paints (Pigments), Dyes	VOC's Metals, Phenolics, Mineral Spirits VOC's Metals Metals
Woods	Sawdust Particle Board Dusts (Formaldehyde) Treated Woods	BOD Formaldehyde Copper, Creosote
Masonry & Concrete	Dusts (Brick, Cement) Colored Chalks (Pigments) Concrete Curing Compounds Glazing Compounds Cleaning Surfaces	Acidity, Sediments Metals Asbestos Acidity
Floors & Walls	Flashing Drywall Tile Cutting (Ceramic Dusts) Adhesives*	Copper, Aluminum Dusts Minerals
Remodeling & Demolition*	Insulation Venting Systems Dusts (Brick, Cement, Saw, Drywall)	Asbestos Aluminum, Zinc
Air Conditioning & Heating	Insulating Coolant Reservoirs Adhesives*	Asbestos Freon
Yard O & M	Vehicle and Machinery Maintenance Gasoline, Oils, Additives Marking Paints (Sprays) Grading, Earth Moving Portable Toilets Fire Hazard Control (Herbicides) Health and Safety Wash Waters* (Herbicides, Concrete, Oils, Greases)	Oils and Grease, Coolants Benzene & Derivatives, Oils & Grease Vinyl Chloride, Metals Erosion (Sediments) BOD, Disinfectants (Spills) Sodium Arsenite, Dinitro Compounds Rodenticides, Insecticides
Landscaping & Earthmoving	Planting, Plant Maintenance Excavation, Tilling Masonry & Concrete* Solid Wastes (Trees, Shrubs) Exposing Natural Lime or Other Mineral Deposits Soils Additives Revegetation of Graded Areas	Pesticides, Herbicides, Nutrients Erosion (Sediments) BOD Acidity/Alkalinity, Metals Aluminum Sulfate, Sulfur Fertilizers
Materials Storage	Waste Storage (Used Oils, Solvents, Etc.) Hazardous Waste Containment Raw Material Piles	Spills, Leaks Spills, Leaks Dusts, Sediments

* See above categories.

Note: VOC = Volatile Organic Compounds. BOD = Biochemical Oxygen Demand due to the use of oxygen by decomposing materials.

References: USEPA, 1973. Processes, Procedures, and Methods to Control Pollution Resulting From Construction Activity. Office of Air and Water Programs, EPA

THESE MATERIALS TYPICALLY USED AT A CONSTRUCTION SITE HAVE THE POTENTIAL TO CONTRIBUTE TO THE DISCHARGE OF POLLUTANTS OTHER THAN SEDIMENT IN STORM WATER.

3.3 Soil Characteristics

The project area consists of soil type D, per the Soils Group Map included in the County Hydrology Manual.

4.0 MITIGATION MEASURES TO PROTECT WATER QUALITY

To address water quality for the project, BMPs will be implemented during construction and post-construction.

4.1 Construction BMPs

A detailed description of the construction BMPs will be developed during the Grading Plan and Improvement Plan Engineering. Since the project is in the preliminary development phase only a listing of potential types of temporary BMPs are available. This includes the following:

- Silt Fence
- Fiber Rolls
- Street Sweeping and Vacuuming
- Storm Drain Inlet Protection
- Stockpile Management
- Solid Waste Management
- Stabilized Construction Entrance/Exit
- Dewatering Operations
- Vehicle and Equipment Maintenance uncovered areas
- Erosion Control Mats and Spray-on Applications
- Desilting Basin
- Gravel Bag Berm
- Sandbag Barrier
- Material Delivery and Storage
- Spill Prevention and Control
- Concrete Waste Management
- Water Conservation Practices
- Paving and Grinding Operations
- Permanent Revegetation of All disturbed areas

Construction BMPs for this project will be selected, constructed, and maintained so as to comply with all applicable ordinances and guidance documents.

4.2 Post-construction BMPs

Pollutants of concern as noted in the table titled **TYPICAL POST CONSTRUCTION POLLUTANTS**, in section 3.2 will be addressed through the utilization of three types of BMPs. These types of BMPs are Site Design, Source Control and Treatment Control.

The proposed development site design will have a significant role in not only minimizing the potential discharge of suspended pollutants in storm water, but will dramatically improve the storm water quality of the storm water discharged from the entire project site. The abandoning of agricultural operations and reducing the area that will be utilized in the development, as compared to the agricultural area currently being utilized will reduce the potential for pollutant discharge from the site. In addition to the change in the project site usage, the proposed project is designed to minimize the use of impervious area, in fact only 0.14 acres (approximately 2% of the total developed area) of the proposed development will be impervious surfaces at this time. Soil stabilization of the slopes and disturbed areas are incorporated into the project design. The landscaping on the site will consist of both native and non-native plants. The goal is to achieve plant establishment expeditiously to reduce erosion. The irrigation system for these landscaped areas will be monitored to reduce over irrigation.

The homeowner's will have the responsibility of ensuring that source control BMPs are effective. Homeowner's will be provided with literature containing standard language provided by the Region Water Quality Control Board to educate them on the importance of minimizing the use and discharge of pollutants (source control) and means to do so.

In addition to Site Design and Source Control BMPs, the proposed project site design incorporates the use of Treatment control BMP's that will be implemented to address water quality goals:

- Landscaping
- Bio-Filters (grassy swales)

Placements of the BMP's are noted on the project Grading Plans.

4.2.1 Landscaping

Permanent Landscaping and irrigation will be installed on all graded areas, in order to prevent erosion of un-stabilized soils. Landscaping will not only act as an anchor to lock sediment and soil in place along the slope, but will also act as a protective barrier from the direct impact of rainfall. The landscaping will intercept rainfall with its branches and leaves and the water will not come in contact with soil with the same magnitude of force it would if the rainfall were to fall directly on to the soil surface unimpeded by any natural or foreign object.

4.2.2 Bio Filters

Bio Filtration strips, also known as vegetated buffer strips or grassy swales, are vegetated sections of land over which storm water flows as overland sheet flow. The biofiltration system proposed for this project utilizes slope rounding berms, ditches and the existing natural drainages as shown on the attached project plans. Pollutants are removed by filtration through the existing soils and vegetation. Biofiltration swales are mainly effective at removing debris and solid particles, although some dissolved constituents are removed by absorption onto the soil. The drainage swales shown on the Replacement Tentative Parcel Map, are to be constructed with a grass lining.

5.0 OPERATION AND MAINTENANCE PROGRAM

5.1 Bio-Filters

The operational and maintenance needs of a Bio-filter Swale are:

- Vegetation management to maintain adequate hydraulic functioning and to limit habitat for disease-carrying animals.
- Animal and vector control.
- Periodic sediment removal to optimize performance.
- Trash, debris, grass trimmings, tree pruning, and leaf collection and removal to prevent obstruction of a Swale and monitoring equipment.
- Erosion and structural maintenance to prevent the loss of soil and maintain the performance of the Swale.

Functional Maintenance

Functional maintenance has two components:

- Preventive maintenance
- Corrective maintenance

Preventive Maintenance

Preventive maintenance activities to be instituted at a Bio-filter Swale are:

- **Trash and Debris.** During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.
- **Sediment Removal.** Sediment accumulation, as part of the operation and maintenance program at a Swale, will be monitored once a month during the dry season, after every large storm (0.50 inch), and monthly during the wet season. Specifically, if sediment reaches a level at or near plant height, or could interfere with flow or operation, the sediment will be removed. If accumulation of debris or sediment is determined to be the cause of decline in design performance, prompt action (i.e., within ten working days) will be taken to restore the Swale to design performance standards. Removal of Standing Water. Standing water must be removed if it contributes to the development of aquatic plant communities or mosquito breeding areas.
- **Fertilization and Irrigation.** The vegetation seed mix has been designed so that fertilization and irrigation is not necessary. Fertilizers and irrigation will not be used to maintain the vegetation.

- **Elimination of Mosquito Breeding Habitats.** The most effective mosquito control program is one that eliminates potential breeding habitats.

Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of a Bio-filter Swale. Corrective maintenance activities include:

- **Removal of Debris and Sediment.** Sediment, debris, and trash, which impede the hydraulic functioning of a Swale and prevent vegetative growth, will be removed and properly disposed.
- **Structural Repairs.** Once deemed necessary, repairs to structural components of a Swale and its inlet and outlet structures will be done within 10 working days.
- **Embankment and Slope Repairs.** Once deemed necessary, damage to the embankments and slopes of Swales will be repaired within 10 working days).
- **Erosion Repair.** Where a reseeding program has been ineffective, or where other factors have created erosive conditions (i.e., pedestrian traffic, concentrated flow, etc.), corrective steps will be taken to prevent loss of soil and any subsequent danger to the performance of a Swale. There are a number of corrective actions than can be taken. These include erosion control blankets, riprap.

Hazardous Waste

Suspected hazardous wastes will be analyzed to determine disposal options. Hazardous wastes generated onsite will be handled and disposed of according to applicable local, state, and federal regulations. A solid or liquid waste is considered a hazardous waste if it exceeds the criteria list in the CCR, Title 22, Article 11.

5.2 Maintenance Category

Bio-swales: Category 1

As described in the County Stormwater Maintenance Plan, bio-filters (grassy swales) within the Tam TPM fall within the "First Category". The maintenance of the bio-filters (grassy swales), used as pad treatment, will be the responsibility of the individual private land owner. The County should have only minimal concerns for ongoing maintenance. The proposed Bio-filter inherently "take care of themselves", or property owners can naturally be expected to do so as an incident of taking care of their property.

5.3 Annual Cost of Maintenance

ANNUAL COST ESTIMATE:

Grassy swale Bio-filter Bmp maintenance -	\$2972.42
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TOTAL: \$2,972.42

TWO-YEAR COST ESTIMATE:

Grassy swale Bio-filter Bmp maintenance -	\$5944.84
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TOTAL: \$5,944.84

TEN-YEAR COST ESTIMATE:

Grassy swale Bio-filter Bmp maintenance -	\$29724.20
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TOTAL: \$29,724.20

6.0 FISCAL RESOURCES

The maintenance of the landscaping berm will be performed as necessary by the private land owner. The land owner will be subject to all applicable ordinances referenced herein.

The maintenance of the biofiltration swales will be performed as necessary by the land owner and the site managers and once the development is complete the homeowner will assume all financial responsibility for ensuring that the treatment devices are maintained. The land owner and the site managers will be subject to all applicable ordinances referenced herein.

7.0 SUMMARY/CONCLUSIONS

This SWMP has been prepared in accordance with the Watershed Protection, Stormwater Management, and Discharge Control Ordinance and the Stormwater Standards Manual. This SWMP has evaluated and addressed the potential pollutants associated with this project and their effects on water quality. The following is a summary of the facts and findings associated with this project and the measures addressed by this SWMP.

The storm water quality goals established for the proposed project will be primarily addressed through Site Design BMPs. The conversion of the existing site into a residential development will not deteriorate the storm water quality of storm water runoff from the site.

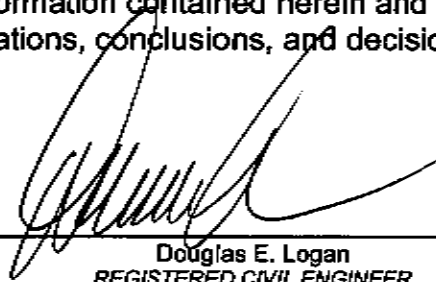
The primary method of treatment to meet the developed condition storm water quality goals set for this project will be facilitated through the design of grass lined swales or Biofilters. These grass lined swales will be located at upstream of all the points of discharge of "urban runoff", essentially all runoff that comes in contact with the disturbed areas associated with this development will be treated in a grass lined swale. The required treatment flow, the 85th percentile storm water runoff flow is found to be 0.41 cfs for the entire site.

In addition to the proposed grass lined swales, storm water quality will be improved due to the fact that storm water will be discharged from the site by utilizing existing natural channels which will provide/promote further settlement of suspended pollutants and filtration by the existing vegetation. The combination of site design, source control and the treatment control BMPs, in this case grass lined swales, storm water quality issues are addressed.

In conclusion the combination of proposed construction and permanent BMP's will reduce, to the maximum extent practicable, the expected project pollutants and will not adversely impact the beneficial uses of the receiving waters.

Storm Water Management Plan for
29610 Mac Tan Road, Valley Center

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.



Douglas E. Logan
REGISTERED CIVIL ENGINEER

8-11-08

DATE

Storm Water Management Plan for
29610 Mac Tan Road, Valley Center

8.0 County of San Diego SWMP 05 checklist for Major SWMP